

CLAIMS

The invention claimed is

1. A nanofiltration system comprising:
a filtration chamber having an input connection and an output connection;
an input feed line containing a mixture of water, acids and sugars, the input feed line coupled to the filtration chamber input connection;
an output line coupled to the filtration chamber output connection; and
a nanofiltration membrane positioned within the filtration chamber, the membrane having a first side in fluid communication with the input feed line to receive the mixture therefrom and a second side opposite the first side, the second side being in fluid communication with the output line, the membrane allowing passage of the acids in the mixture while substantially blocking passage of the sugars in the mixture.
2. The system of claim 1, further comprising a chromatographic unit having an first input to receive water and a second input to receive a mixture of water, acid and sugar, the chromatographic unit performing a partial separation of acids and sugars and having a first output to supply the separated sugar and a second output coupled to the input feed line to supply the mixture of water, acids and sugars to the filtration chamber.
3. The system of claim 2, further comprising a feedback line from the nanofiltration unit to the chromatographic unit, the feedback line returning concentrate sugar to the chromatographic unit for further separation.
4. The system of claim 2, further comprising:

a pre-filtration chamber having an input connection and an output connection;

an input feed line containing a mixture of water, acids and sugars, the input feed line coupled to the pre-filtration chamber input connection;

an output line coupled to the second input of the chromatographic unit;

and

a pre-filter nanofiltration membrane positioned within the pre-filtration chamber, the membrane having a first side in fluid communication with the input feed line to receive the mixture therefrom and a second side opposite the first side, the membrane allowing passage of the acids in the mixture from the membrane first side to the membrane second side while substantially blocking passage of the sugars in the mixture.

5. The system of claim 1, further comprising a sugar processing system coupled to the first output of the chromatographic unit to receive the separated sugar therefrom, the sugar processing system processing the sugar into a final product.

6. The system of claim 5 wherein the sugar processing system is a fermentation/distillation system and processes the sugar into ethanol.

7. The system of claim 5 wherein the sugar processing processes the sugar into a sweetener.

8. The system of claim 1, further comprising an acid processing system coupled to the output line coupled to the filtration chamber.

9. The system of claim 8 wherein the acid processing system reconcentrates the acid for subsequent reuse.

10. A nanofiltration method comprising:
receiving a mixture of water, acids and sugars from a hydrolysis reaction;
passing the mixture through a chromatographic unit, the chromatographic unit performing a separation of acids and sugars and having a first output to supply separated sugar and a second output to supply sugar-contaminated acid; and
filtering the sugar-contaminated acid using a nanofiltration membrane, the membrane having a first side in fluid communication with sugar-contaminated acid and a second side opposite the first side in fluid communication with an output line, the membrane allowing passage of the acids in the mixture while substantially blocking passage of the sugars in the mixture.

11. The method of claim 10, further comprising pre-filtering the mixture prior to passing the mixture through the chromatographic unit by
filtering the mixture using a pre-filter nanofiltration membrane, the pre-filter membrane having a first side in fluid communication with the mixture and allowing passage of the acids in the mixture from the first side of the pre-filter membrane to a second side of the pre-filter membrane while substantially blocking passage of the sugars in the mixture.

12. The method of claim 10, further comprising returning concentrate sugar from the nanofilter membrane first side to the chromatographic unit for further separation.

13. The method of claim 10, further comprising receiving the separated sugar and processing the sugar into a final product.

14. The method of claim 13 wherein processing the sugar into a final product comprises fermenting and distilling, the final product being ethanol.

15. The method of claim 13 wherein the final product is a sweetener.

15. The method of claim 10, further comprising processing acids from the nanofilter membrane second side.

17. The method of claim 16 wherein processing acids comprises reconcentrating the acid for subsequent reuse.